UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/912,068	07/23/2001	Song Zhang	020510-001700US	3277

		EXAMINER
7590	11/19/2004	TRAN, KHANH C

KRIS V. KALIDINDI, ESQ.
POTOMAC PATENT GROUP,LLC
2010 CORPORATE RIDGE
SUITE 700
MCLEAN, VA 22102

ART UNIT	PAPER NUMBER
2631	

DATE MAILED: 11/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	**Applicant(s)**
Office Action Summary	09/912,068	ZHANG ET AL.
	Examiner	**Art Unit**	
	Khanh Tran	2631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL.**   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle,* 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-48* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,12,15,17,20-23,27,35,39 and 42-46* is/are rejected.

7)☒ Claim(s) *4-11,13,14,16,18,19,24-26,28-34,36-38,40,41,47 and 48* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All   b)☐ Some * c)☐ None of:

      1.☒ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date *11/15/2004.*

4)☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____ .

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the claimed features "*said encoding is performed by multiple turbo encoders*" in claim 16, and the claimed features "*at least one turbo encoder comprises multiple turbo encoders*" in claim 38 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will

be notified and informed of any required corrective action in the next Office action. The

objection to the drawings will not be held in abeyance.

Claim Objections

2. Claim 26 is objected to because of the following informalities: in line 1, "claim

26" should be changed to -- claim 24 --. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-3, 15, 17, 20-23, 27, 39 and 42-45 are rejected under 35 U.S.C.

103(a) as being unpatentable over Jin U.S. Patent 6,671,327 in view of Paik et al. U.S.

Patent 5,233,629.

Regarding claims 1 and 27, Jin discloses in the abstract of the cited US patent a

method for transmitting data over a communications channel.

In regarding to the claimed step of "_dividing said sequence of information bits into_

encoding bits and parallel bits", Jin does not expressly teach the step of dividing the

incoming bits into encoding bits and parallel bits as claimed. However, as shown in one

embodiment in figure 3, input bits arrive in parallel, wherein a portion of an incoming bit

stream is fed to encoder data block 10. As result of that, the foregoing disclosure

impliedly addresses the claimed step, see column 2, lines 43-49.

In regarding to the claimed step of "*encoding said encoding bits to produce*

encoded bits", as recited above, a portion of an incoming bit stream is fed to encoder

data block 10. Outputs from data block 10, comprising three bits u_1 u_2 u_3 and three bits

u'_1 u'_2 u'_3 are passed through turbo encoder 20 to produce encoded bits.

In regarding to the claimed step of "*mapping said encoding bits and parallel bits*

into first and second pulse amplitude modulation (PAM) signals", Jin does not expressly

teach the step of mapping as set forth in the claim. However, Jin expresses that a

constellation encoder structure employed is similar to that used in an ADSL system in

which a quadrature amplitude modulation (QAM) modulator is usually employed. Jin

also discusses, in Background of the Invention, QAM system, and turbo code being

used in DSL (Digital Subscriber Line) system. Also discussed in Background of the

Invention of another US patent (5,233,629), Paik et al. discusses, in column 1 lines 22-

31, in order to communicate digital data via an analog channel, the data is modulated

using, for example, a pulse amplitude modulation (PAM), which is in one dimension.

Typically, QAM is used to increase the amount of data that can be transmitted within an

available channel bandwidth. QAM is a two-dimensional form of PAM in which a

plurality of bits of information is transmitted together in a constellation. Jin further

discloses a general case wherein the binary words v and w, representative of parallel

bits and turbo coded bits, are used to look up two constellation points. As discussed in

Paik et al. invention, it would have been obvious for one of ordinary skill in the art at the

time the invention was made that the binary words v and w are mapped into first and second PAM signals first, and the constellation encoder generates a QAM signal, which represents first and second PAM signals.

Regarding claim 2, the modulation scheme taught in Jin invention is for transmitting data over a communication channel. As a result of that, the method in claim 1 further includes a step of transmitting a QAM signal over a communication channel.

Regarding claim 3, Jin invention is directed to a modulation scheme for transmitting data over a communication channel, in a discrete multi-tone modulation (DMT) system. Jin further teaches that the constellation encoder structure employed is similar to that used in an ADSL system. Because Jin teachings reference the modulation scheme to DSL modulation system and ADSL system, it would have been obvious for one of ordinary skill in the art at the time the invention was made that Jin invention can be implemented in ADSL communication system.

Regarding claim 15, figure 1 shows the encoding is performed by Turbo encoder.

Regarding claims 17 and 39, the turbo encoder in figure 1 is a serial concatenated turbo encoder.

Regarding claims 20 and 42, figure 3 illustrates the encoded bit form a binary word w, and the unencoded bits form another binary word u, which are used to look up two constellation points, corresponding to the claimed forming a first vector and a second vector.

Regarding claims 21 and 43, in column 2, line 63 through column 3 line 2, Jin discloses the two binary words v and w used to look up two constellation points. In view of that, the binary words are mapped into the first PAM signal and second PAM signal as recited in claim 1.

Regarding claims 22 and 44, shown in figure 3, w only includes encoded bits and v only includes parallel bits. Hence, each of the first PAM signal and second PAM signal is formed from alternate ones of the encoded bits and parallel bits.

Regarding claims 23 and 45, in column 1 lines 61-65, Jin teaches that the turbo coder is preferably used to code only the least significant bit (LSB) in the constellation. In view of that, alternating ones of encoded bits form least significant bits, and alternate ones of parallel bits form most significant bits of each of PAM signals.

4. Claims 12 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jin U.S. Patent 6,671,327 and Paik et al. U.S. Patent 5,233,629 as applied to claims 1 and 27 above, and further in view of Markarian et al. U.S. Patent 6,553,539 B1.

Regarding claims 12 and 35, Jin and Paik et al. do not expressly disclose the
encoded bits consist of systematic bits and parity bits. Jin utilizes a turbo encoder in
figure 1. By definition, Turbo codes are parallel-concatenated recursive systematic
convolutional codes. In view of that, the encoded bits consist of systematic bits.
Furthermore, Markarian et al. discloses in column 2 lines 1-8, turbo encoder encode
input word to generate corresponding bits and parity bits. As a result of that, it would
have been obvious for one of ordinary skill in the art at the time the invention was made
that Turbo encoder produces systematic bits and parity bits. There is no need to state a
motivation here because Turbo encoder inherently produces systematic bits and parity
bits.

5. Claims 24 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable
over Jin U.S. Patent 6,671,327 and Paik et al. U.S. Patent 5,233,629 as applied to claim
1 above, and further in view of Gelblum et al. U.S. Patent 6,088,387.

Regarding claims 24 and 46, Jin and Paik et al. disclose all the claimed
limitations, but do not teach mapping is a concatenated Gray mapping. Gelblum et al.
teaches a similar apparatus for implementing turbo code and trellis code modulation in a
multi tone communications environment. Figure 1 illustrates a modem in which a portion
of information bits is turbo coded and the other information bits are uncoded. Referring
to figure 2, in column 5 lines 37-45, the assignments of bits to the M-QAM symbols can
employ any suitable mapping scheme as Gray mapping, which is well known in the art.

Because of the known potential advantage of Gray mapping, one of ordinary skill in the art would have been motivated to implement Gray mapping into Jin system.

Allowable Subject Matter

6. Claims 4-11, 13-14, 16, 18-19, 25-26, 28-34, 36-38, 40-41, and 47-48 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Sasaki U.S. Patent 5,408,499 discloses "Multilevel Code For Transmission Device".

Herzberg U.S. Patent 5,970,098 discloses "Multilevel Encoder".

Wei U.S. Patent 6,473,878 discloses "Serial-Concatenated Turbo Codes".

Kim et al. U.S. Patent 6,374,386 discloses "Device And Method For Inserting Previously Known Bits In Input Stage Of Channel Encoder".

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh Tran whose telephone number is 571-272-3007. The examiner can normally be reached on Monday - Friday from 08:00 AM - 05:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KCT

KHANH   TRAN